REMARKS

Claims 28 to 47 are pending. No claims are allowed, however, claims 34, 36 and 37 are objected to. Claims 34, 39 and 40 are canceled and claims 41 to 47 are new.

1. Claims 28 to 33, 35 and 38 to 40 are rejected under 35 USC 103(a) as being unpatentable over Elmquist et al. (U.S. Patent No. 4,602,637) in view of Baker, Jr. (U.S. Patent No. 4,679,572). Elmquist et al. relates to a heart pacemaker having a titanium housing. As described at column 4, lines 24 to 27, the housing is provided "with an area 11 at one side thereof having a porous layer of, for example, titanium nitride." At column 4, line 42+, a further "tight non-porous layer 11a is disposed between the porous layer 11 and the housing carrier material 10. The non-porous layer 11a serves as a sealing layer, and consists of the same material as the porous layer 11."

At page 6, lines 22 to 28 of the specification, the Applicants' invention is described as beginning with the substrate in a vacuum chamber. The substrate is sputter etched then sputter coated with titanium in an argon atmosphere. The inert atmosphere ensures that only elemental titanium is initially deposited until "nitrogen is introduced into the chamber" while an RF bias is being applied to the substrate. It is known in the art that an RF bias generally produces a more dense coating than if there were no bias. After a period of time, the RF bias is removed and the sputtering with titanium in the nitrogen atmosphere continues for several hours. Removing the bias

is known to generally produce a less dense, more porous coating than one deposited under the influence of an RF bias. Thus, the more dense and then less dense titanium coatings deposited in the nitrogen rich atmosphere are similar to the "tight non-porous layer 11a" intermediate the porous layer 11 and the pacemaker housing of Elmquist et al.

However, there is no teaching, much less a suggestion, in this prior art patent to first contact the substrate or workpiece housing with an elemental form of a metal that is the same metal used to provide the subsequent dense then less dense layers. The first elemental metal layer is critical to forming a robust bond between the subsequent layers and the substrate. For example, when the substrate is of titanium, as is the case with Elmquist et al., the outer, uncoated substrate layer is believed to be an oxidized form of the metal, such as TiO for a titanium housing. In the Applicants' invention, the elemental titanium then reacts with the oxygen atoms at the surface interface to form titanium oxide integrally bonded to the substrate. Then, the subsequent layers bond to the elemental metal layer to form an extremely strong and robust coating on the housing substrate.

Baker, Jr. teaches coating iridium oxide directly to a substrate. Suitable materials for the substrate are platinum, platinum-iridium alloy, iridium, tantalum and titanium. However, as discussed above, this means that the iridium oxide layer is directly contacting a native oxide layer of the substrate material. It is known that oxides are significantly less conductive than carbide, nitride and carbonitride forms of the same metal. For example, the

resistivity of titanium carbide is 9 x 10^{-5} ohm-cm and that of titanium nitride is 2.5 x 10^{-5} ohm-cm. On the other hand, the resistivity of titanium oxide is 1 x 10^{13} ohm-cm. This is a significant difference. In that regard, carbides and nitrides are relatively close in conductivity to that of the elemental metal while oxides are generally insulative.

Therefore, one skilled in the art having studied the Elmquist et al. patent would not have understood the benefit of first coating an elemental metal on the substrate followed by at least one carbide, nitride or carbonitride layer of the same metal. Baker, Jr. would not have taught the skilled artisan that it is beneficial to first provide a conductive layer of a metal in the form of a carbide, nitride or carbonitride before next applying the iridium-containing layer.

Accordingly, amended independent claim 28 is believed to be patentable over the combination of cited patent references. Claims 29 to 33 and 38 are believed to be allowable as hinging from a patentable base claim. Claims 39 and 40 are canceled.

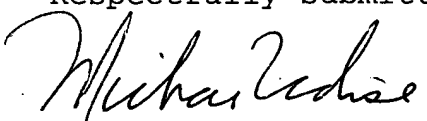
Reconsideration of this rejection is requested.

2. Claims 34, 36 and 37 are objected to. In that respect, the subject matter of claims 28 and 34 has been combined to provide amended independent claim 40. The subject matter of claims 28, 35 and 36 has been combined to provide new claim 42. The subject matter of claims 28, 35 and 37 has been combined to provide new claim 43.

3. A clean copy of the pending claims is attached to the end of this amendment.

It is believed that claims 28 to 33, 35 to 38, and 41 to 47 are in condition for allowance. Notice of Allowance is requested.

Respectfully submitted,



Michael F. Scalise
Reg. No. 34,920

Wilson Greatbatch Technologies, Inc.
10,000 Wehrle Drive
Clarence, NY 14031
(716) 759-5810
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